

WHAT IS CLAIMED IS:

Sub B1
~~1. A multilayer printed wiring board manufacturing~~

apparatus, to be used for processing a multilayer printed wiring
5 board having an interlayer resin insulator, comprising:

a processing laser source, a scanning head for deflecting
the laser beam in the X-Y directions, a camera for reading the
positioning marks of a multilayer printed wiring board, an X-Y
table for placing a multilayer printed wiring board, an input
10 section for inputting the processing data of the multilayer
printed wiring board, a memory section for storing the
processing data or the arithmetic operations result and an
arithmetic operating section, wherein

the processing data is input from the input section and
15 this processing data is stored in the memory section;

a position of the positioning mark of the multilayer
printed wiring board placed on the X-Y table is measured with
the camera;

the input processing data is corrected on the basis of
20 the measured position of the positioning mark to generate the
X-Y table drive data in the arithmetic section and this drive
data is then stored in the memory section; and

the drive data is read from the memory section and then
the X-Y table and the scanning head are controlled in the control
25 section and thereby the laser beam is radiated to the multilayer
printed wiring board to eliminate the interlayer resin layer
~~to form the hole.~~

2. The multilayer printed wiring board manufacturing
apparatus according to claim 1, wherein said positioning mark

is formed of a metal conductor.

3. The multilayer printed wiring board manufacturing apparatus according to claim 1, wherein said positioning mark is formed simultaneously with a conductive circuit.

5 ~~4. A multilayer printed wiring board manufacturing method~~
comprising the steps of:

forming the positioning mark and interlayer insulating agent layer on a multilayer printed wiring board;

10 placing a multilayer printed wiring board having formed said positioning mark on the X-Y table of the multilayer printed wiring board manufacturing apparatus consisting of a processing laser source, a scanning head for deflecting the direction of laser beam in the X-Y directions, a camera for reading the positioning mark of the multilayer printed wiring board, an X-Y
15 table for placing the multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, and inputting the processing data
20 to this manufacturing apparatus;

measuring the position of the positioning mark of the multilayer printed wiring board with the camera, correcting the input processing data based on the measured positioning mark position to generate the scanning head and the X-Y table drive
25 data in the arithmetic operating section and then storing this drive data in the memory section; and

reading the drive data from the memory section to control the X-Y table and the scanning head in the control section and
~~radiating the laser beam to the multilayer printed wiring board~~

to eliminate the interlayer resin layer to form a hole.

5. A multilayer printed wiring board manufacturing apparatus comprising a CO₂ laser source, a scanning head for deflecting the direction of laser beam in the X-Y directions or an X-Y table for displacing the position of the multilayer printed wiring board, wherein the laser beam oscillated from said CO₂ laser source is converted to the beam of shortened wavelength by harmonic wave generating means.

6. A multilayer printed wiring board manufacturing apparatus comprising a processing laser source, harmonic wave generating means for converting the laser beam oscillated from said processing laser source to the shortened wavelength beam of second harmonic wave and a scanning head for deflecting the direction of the laser beam in the X-Y directions or an X-Y table for displacing position of the multilayer printed wiring board, wherein the wavelength of said processing laser source is between 720nm or less and the minimum wavelength of the laser source or more, or between 6000nm or more and the maximum wavelength of the laser source or less.

7. A multilayer printed wiring board manufacturing apparatus, comprising:

a CO₂ laser source, a scanning head for deflecting the laser beam in the X-Y directions, a camera for reading the positioning marks of a multilayer printed wiring board, an X-Y table for placing a multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result, and an arithmetic operating section, wherein

the processing data is input from the input section and this processing data is stored in the memory section;

position of the target mark of the multilayer printed wiring board placed on the X-Y table is measured with the camera;

5 the data for driving the scanning head and the X-Y table is generated from the measured position and the input processing data in the arithmetic operating section, and the drive data is stored in the memory section; and

10 the drive data is read from the memory section and then the X-Y table and the scanning head are controlled in the control section and thereby the laser beam is radiated to the multilayer printed wiring board to eliminate the interlayer resin layer to form the hole,

15 the laser beam oscillated from said CO₂ laser source being converted to the shortened wavelength laser beam of second harmonic wave by harmonic wave generating means.

20 8. The multilayer printed wiring board manufacturing apparatus according to any claim of claims 5 to 7, wherein said harmonic wave generating means is a non-linear optical crystal which reflects the processing laser to the harmonic wave emitting side and gives thereto the function to transmitting harmonic wave.

25 9. The multilayer printed wiring board manufacturing apparatus according to claim 8, wherein said non-linear optical crystal is formed of a material selected from tellurium, gallium-selenium, antimony sulfide, arsenic sulfide, mercury sulfide and selenium.

10. A multilayer printed wiring board manufacturing method utilizing a manufacturing apparatus comprising a CO₂

laser source, a harmonic wave generating apparatus for
converting the laser beam from said CO₂ laser source to the
shortened wavelength beam of the second harmonic wave, a
scanning head for deflecting the direction of the laser beam
5 in the X-Y directions, a camera for reading the target mark of
the multilayer printed wiring board and an X-Y table for placing
the multilayer printed wiring board, comprising the steps of:

measuring, with a camera, the target mark position of the
multilayer printed wiring board having the interlayer resin
10 insulator placed on the X-Y table;

generating the scanning head and the X-Y table drive data
from the measured position and the processing data; and

controlling the X-Y table and the scanning head based on
the drive data and radiating the shortened wavelength beam of
15 the second harmonic wave obtained from the harmonic wave
generating apparatus to the multilayer printed wiring board to
eliminate the interlayer resin layer to form a hole.

Sub B3
~~11. A laser processing apparatus comprising a CO₂ laser
source, a scanning head for deflecting the direction of laser
beam to the X-Y directions or an X-Y table for displacing the
position of a work piece to be processed, wherein the laser beam
oscillated from said CO₂ laser source is converted to the
shortened wavelength beam by harmonic wave generating means.~~

~~12. A laser processing apparatus comprising a processing
25 laser source, harmonic wave generating means for converting the
laser beam oscillated from said processing laser source to the
shortened wavelength beam of the second harmonic wave, and a
scanning head for deflecting the direction of the laser beam
to the X-Y directions or an X-Y table for displacing the position~~

of a work piece to be processed, wherein the wavelength of said processing laser source is between 720nm or less and the minimum wavelength of the laser source or more, or between 6000nm or more and the maximum wavelength of the laser source or less.

5 13. A multilayer printed wiring board manufacturing apparatus, to be used for processing a multilayer printed wiring board having an interlayer resin insulator, comprising:

10 a processing laser source, a scanning head for deflecting the laser beam in the X-Y directions, a camera for reading the positioning marks of a multilayer printed wiring board, an X-Y table for placing a multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an
15 arithmetic operating section, wherein

said X-Y table is provided with a light source embedded to the area corresponding to the positioning mark of the multilayer printed wiring board.

20 14. A multilayer printed wiring board manufacturing apparatus, to be used for processing a multilayer printed wiring board having an interlayer resin insulator, comprising a processing laser source, a scanning head for deflecting the laser beam in the X-Y directions, a camera for reading the positioning marks of a multilayer printed wiring board, an X-Y
25 table for placing a multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, wherein

said X-Y table is provided with a light source embedded at the area corresponding to the positioning mark of the multilayer printed wiring board;

the processing data is input from the input section and
5 this processing data is stored in the memory section;

silhouette generated when the light beam from the light source of the X-Y table is shielded by the positioning mark is read by the camera to measure the position of the positioning mark of the multilayer printed wiring board placed on the X-Y
10 table;

the data for driving the scanning head and the X-Y table is generated from the measured position and the input processing data in the arithmetic operating section, and the drive data is stored in the memory section; and

15 the drive data is read from the memory section and then the X-Y table and the scanning head are controlled in the control section and thereby the laser beam is radiated to the multilayer printed wiring board to eliminate the interlayer resin layer to form the hole.

20 15. The multilayer printed wiring board manufacturing apparatus according to claim 13 or 14, wherein said light source is an LED.

16. A multilayer printed wiring board manufacturing method utilizing a manufacturing apparatus comprising a
25 processing laser source, a scanning head for deflecting the direction of laser beam in the X-Y directions, a camera for reading the positioning mark of the multilayer printed wiring board and an X-Y table for placing the multilayer printed wiring board to be provided with a light source embedded to the area

corresponding to the positioning mark of the multilayer printed wiring board, comprising the steps of:

forming the positioning mark and an interlayer insulating agent layer on the multilayer printed wiring board;

5 inputting the processing data to said manufacturing apparatus;

reading, with a camera, a silhouette which his generated when the light beam from the light source of said X-Y table is shielded by said positioning mark of the multilayer printed wiring board placed on the X-Y table to measure the position of positioning mark of the multilayer printed wiring board;

generating the data for driving the scanning head and the X-Y table from the measured position and said input processing data; and

15 controlling the X-Y table and the scanning head on the basis of said drive data and radiating the laser beam to the multilayer printed wiring board to eliminate the interlayer resin layer to form a hole.

17. The multilayer printed wiring board manufacturing method according to claim 16, wherein said light source is an LED.

18. The multilayer printed wiring board manufacturing method according to claim 16 or 17, wherein the positioning mark of an upper layer is deviated, when it is formed, from the positioning mark of a lower layer in the step of forming the positioning mark and the interlayer insulating agent layer on said multilayer printed wiring board.

19. A laser processing apparatus comprising a processing laser source, a scanning head for deflecting the direction of

laser beam to the X-Y directions, a camera for reading the positioning mark of a work piece to be processed, an X-Y table for placing the work piece, an input section for inputting the processing data of the work piece, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, wherein said X-Y table is provided with a light source embedded to the area corresponding to the positioning mark of the work piece.

20. A laser processing apparatus comprising a processing laser source, a scanning head for deflecting the direction of laser beam to the X-Y directions and an X-Y table for placing a work piece to process said work piece with the laser beam by controlling the X-Y table and the scanning head, wherein at least two or more scanning heads are provided, a beam splitter is provided between said processing laser source and an optical path of the scanning head and the laser beam is distributed by this beam splitter to supply to each scanning head.

21. A multilayer printed wiring board manufacturing apparatus, to be used for processing a multilayer printed wiring board having an interlayer resin insulator, comprising:

a processing laser source, a scanning head for deflecting the laser beam in the X-Y directions, a camera for reading the target marks of a multilayer printed wiring board, an X-Y table for placing a multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, wherein

the processing data is input from the input section and this processing data is stored in the memory section;

position of the target mark of the multilayer printed wiring board placed on the X-Y table is measured with the camera;

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data to drive the scanning head and the X-Y table is generated from the measured position and the input processing data in the arithmetic section and this drive data is then stored in the memory section; and

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the drive data is read from the memory section and then the X-Y table and the scanning head are controlled in the control section and thereby the laser beam is radiated to the multilayer printed wiring board to eliminate the interlayer resin layer to form the hole,

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said manufacturing apparatus being provided with at least two or more scanning heads, a beam splitter provided between said processing laser source and an optical path of the scanning head, the beam splitter distributing and supplying the laser beam to each scanning head.

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22. The multilayer printed wiring board manufacturing apparatus according to claim 21, wherein when a hole for via hole is not bored with the other scanning head on the occasion of forming the hole for via hole with the laser beam via only one scanning head, the relevant other scanning head scans the area outside the processing object region of a multilayer printed wiring board with the laser beam.

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23. The multilayer printed wiring board manufacturing apparatus according to claim 20 or 21, wherein one transfer mask is arranged between said processing laser source and said beam

splitter.

24. A multilayer printed wiring board manufacturing apparatus according to claim 20 or 21, wherein a transfer mask is respectively arranged between said beam splitter and each scanning head.

25. A multilayer printed wiring board manufacturing method comprising the steps of:

forming a target mark on a multilayer printed wiring board having an interlayer resin insulator;

placing the multilayer printed wiring board having formed said target mark on the X-Y table of the multilayer printed wiring board manufacturing apparatus comprising a processing laser source, at least two or more scanning heads for deflecting the direction of laser beam to the X-Y directions, a camera for reading the target mark of the multilayer printed wiring board, an X-Y table for placing the multilayer printed wiring board, an input section for inputting the processing data of the multilayer printed wiring board, a memory section for storing the processing data or the arithmetic operations result and an arithmetic operating section, and then inputting the processing data to this manufacturing apparatus;

measuring, with the camera, the position of the target mark of the multilayer printed wiring board, generating the data for driving the scanning heads and the X-Y table from the measured position and the input processing data in the arithmetic operating section and storing this drive data to the memory section; and

reading the drive data from the memory section and controlling the X-Y table and the scanning heads in the control

section and radiating the laser beam to the multilayer printed wiring board to eliminate the interlayer resin layer to form the hole for the via hole, wherein

5 the laser beam is distributed by a beam splitter arranged between said processing laser source and an optical path of the scanning head and is then supplied said two or more scanning heads.

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